



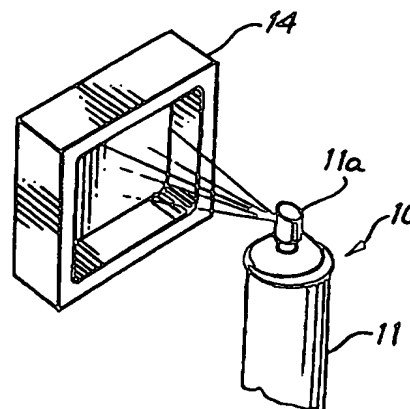
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(54) Title: THERMOPLASTIC SPRAY AND COATING AND METHOD THEREFOR

(57) Abstract

This invention relates to an improved thermoplastic spray material and coating. The thermoplastic spray material (10) will completely dry when it is applied to an interior surface of a mold (14) thus preventing streaks and smears from forming on the exterior surface of the plastic object when the mold goes through the rotational molding process. In its preferred embodiment, the thermoplastic spray material may be applied directly to the exterior surface of a plastic object. The plastic object is then applied a heating means (22) which blends the thermoplastic spray material (10) into and onto the plastic object. In another embodiment of the present invention, a thermoplastic spray material (10) is disclosed which may be applied to a decal like object. The thermoplastic spray material (10) acts as an adhesive so that the decal may adhere to the interior surface of a mold (14). The thermoplastic spray material does not act as a contaminate thus preventing spots, as well as a film, from forming on a plastic object (20) when the mold goes through the rotational molding process.



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THERMOPLASTIC SPRAY AND COATING AND METHOD THEREFOR

BACKGROUND OF THE INVENTION

Field of the Invention:

This invention relates generally to thermoplastic spray materials and coatings and methods therefor and, more specifically, to thermoplastic paints and adhesive sprays and methods therefor that will not leave any spots or residue on the exterior surface of a plastic object.

Description of the Prior Art

Currently, there are numerous coating materials and processes that will allow an individual to apply a color coating to a plastic object. However, all of these current coating materials and processes have a variety of problems. One way in which a plastic object is coated is to apply a thermoplastic coating material to an interior surface of a mold. Plastic powder is then placed inside the mold, and the mold goes through a process called rotational molding. Rotational molding is a process where the mold is placed inside a heating apparatus and is slowly rotated. The heating of the mold causes the plastic powder to liquify, while the rotation of the mold causes the liquified plastic powder to form to the interior surface of the mold. The heat also causes the thermoplastic coating material to blend into the liquified plastic powder. When the rotational molding process is completed and the mold is cooled, a plastic object is formed which has an exterior surface that takes on the color of the thermoplastic coating material. While this thermoplastic coating material and process does work to provide a plastic object with a color coating that will not chip or fade, it does have one main problem. The

thermoplastic coating material that is used to coat the interior surface of the mold never completely dries. Therefore, during the rotational molding process, the tumbling causes the thermoplastic coating material to run and smear. As such, the plastic object that is formed does not have a smooth finish but contains spots and smears on the exterior surface of the plastic object.

Another way to apply a color coating to a plastic object is to simply applying a color coating material to the exterior surface of the plastic object. Any type of color coating material may be used. However, no matter what type of color coating material is used, the color coating material will never bond onto and into the surface of the plastic object. Therefore, over time, the coating material will begin to chip and fade thereby requiring the exterior surface of the plastic object to be repainted.

A plastic object may also be color coated by using a decal like object in the rotational molding process as disclosed in United States Patent Numbers 4,252,762 and 4,519,972. The decal, which may be a sheet of a solid color, or a sheet having a picture, design, or label, is sprayed with an adhesive spray and placed on the interior surface of a mold. The decal is then rubbed onto the interior surface of the mold. Plastic powder is then placed in the inside of the mold, and the mold goes through the rotational molding process. The heat that is applied during the rotational molding process causes the plastic powder to liquify, while the rotation of the mold causes the liquified plastic powder to form to the interior sides of the mold. The heat also causes the decal to blend into the liquified plastic powder thereby causing the decal to be implanted into the exterior surface of the plastic object. While the decal and rotational molding process does work, it does

have several problems. If the interior surface of the mold has a lot of curves or rounded areas, it may be difficult to place and rub off the decal in these areas. Furthermore, if the decal or the interior surface of the mold is large, it may be rather time consuming and strenuous to rub off the decal onto the entire interior surface of the mold. Another problem with the decal and rotational molding process is that the adhesive spray currently being applied to the decal is a contaminate. Thus, the adhesive spray causes spots to form where the decal is located, as well as a film to form around the outer edges of the decal.

Therefore, a need existed to provide a thermoplastic spray material and coating material that when applied to the interior surface of a mold will completely dry thus preventing the coating or spray material from running or smearing when the mold goes through the rotational molding process. As such, when the mold is cooled, the exterior surface of the plastic object will have a smooth finish instead of having spots and smears. A need further existed to provide a thermoplastic spray material that may be applied to the exterior surface of a plastic object and will not chip or fade. As such, the plastic objects will not have to be repainted over time. Finally, a need existed to provide a thermoplastic spray material that may be applied to a decal to help the decal stick to the interior surface of a mold. The spray material must not act as a contaminate thus reducing the possibility of spots or a film from forming on the exterior surface of the plastic object where the decal is located.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an improved thermoplastic spray material and coating material and method therefor.

It is another object of the present invention to provide an improved thermoplastic spray material and coating material and method therefor that will completely dry when applied to an interior surface of a mold thus preventing a plastic object from forming any spots or smears on its exterior surface when the mold goes through the rotational molding process.

It is another object of the present invention to provide an improved thermoplastic spray material and method therefor that may be applied directly to the exterior surface of a plastic object and will not chip or fade.

It is still another object of the present invention to provide an improved thermoplastic spray material and method therefor that when applied to a decal that is placed in the interior of a mold will not act as a contaminate thus preventing spots and a film from forming on the exterior surface of the plastic object during the rotational molding process.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENT

In accordance with one embodiment of the present invention, a thermoplastic spray material for bonding to plastic objects such as polyolefin plastic objects including polyethylene plastic objects is disclosed which comprises adhesive particle means in a range of from about 5% to about 95% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic

objects; particulate polyolefin means in a range of from about 5% to about 95% by weight of total composition for providing a source of polyolefin for said spray material; pigment means in enough concentration to provide the required color opacity for said spray material; and organic solvent means for dissolving said adhesive particle means within said spray material and for carrying said particulate polyolefin means and said pigment means for permitting said spray material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects.

In accordance with another embodiment of this invention, a thermoplastic spray material for bonding to plastic objects such as polyolefin plastic objects including polyethylene plastic objects is disclosed which comprises liquid resin particle means in a range of from about 10% to about 40% by weight of total composition for providing a source of a resin that adheres to the polyolefin plastic objects including the polyethylene plastic objects; solid adhesive particle means in a range of from about 60% to about 90% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects; pigment means in enough concentration to provide the required color opacity for said spray material; and organic solvent means for dissolving said solid adhesive particle means within said spray material and for carrying said liquid resin particle means and said pigment means for permitting said spray material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects.

In accordance with another embodiment of this invention, a thermoplastic coating material for bonding to plastic objects such as polyolefin plastic objects including polyethylene plastic

objects is disclosed which comprises adhesive particle means in a range of from about 0% to about 99% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects; particulate polyolefin means in a range of from about 1% to about 100% by weight of total composition for providing a source of polyolefin for said coating material; and organic solvent means for thinning said adhesive particle means within said coating material to a paste consistency and for carrying said particulate polyolefin means for permitting said coating material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects.

In accordance with another embodiment of this invention, a thermoplastic spray material for bonding graphics to plastic objects such as polyolefin plastic objects including polyethylene plastic object is disclosed comprising rosin particle means in a range of from about 1% to about 99% by weight of total composition for providing a source of a resin that adheres to the polyolefin plastic objects including the polyethylene plastic objects; particulate polyolefin means in a range of from about 1% to about 99% by weight of total composition for providing a source of polyolefin for said spray material; and organic solvent means for dissolving said rosin particle means within said spray material and for carrying said particulate polyolefin means for permitting said spray material to bond graphics to the polyolefin plastic objects including the polyethylene plastic objects.

In accordance with another embodiment of this invention, a thermoplastic spray material for bonding graphics to plastic objects such as polyolefin plastic objects including polyethylene

plastic object is disclosed comprising polymer means in a range of from about 1% to about 10% by weight of total composition for providing an adhesive characteristic to said spray material; solid adhesive particle means in a range of from about 90% to about 99% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including polyethylene plastic objects; and organic solvent means for dissolving said solid adhesive particle means within said spray material and for carrying said polymer means for permitting said spray material to bond said graphics to the polyolefin plastic objects including the polyethylene plastic object.

In accordance with another embodiment of this invention, a method of preparing a thermoplastic spray material for bonding to plastic objects such as polyolefin plastic objects including polyethylene plastic objects is disclosed comprising the steps of providing adhesive particle means in a range of from about 5% to about 95% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects; providing a particulate polyolefin means in a range of from about 5% to about 95% by weight of total composition for providing a source of polyolefin for said spray material; providing a pigment means in enough concentration to provide the required color opacity for said spray material; and combining said adhesive particle means, said particulate polyolefin means, and said pigment means with organic solvent means for dissolving said adhesive particle means within said spray material and for carrying said particulate polyolefin means and said pigment means for permitting said spray material to be bonded to the

polyolefin plastic objects including the polyethylene plastic objects.

In accordance with another embodiment of this invention, a method of preparing a thermoplastic spray material for bonding to plastic objects such as polyolefin plastic objects including polyethylene plastic objects is disclosed comprising the steps of providing liquid resin particle means in a range of from about 10% to about 40% by weight of total composition for providing a source of a resin that adheres to the polyolefin plastic objects including the polyethylene plastic objects; providing solid adhesive particle means in a range of from about 60% to about 90% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects; providing pigment means in enough concentration to provide the required color opacity for said spray material; and combining said liquid resin particle means, said solid adhesive particle means, and said pigment means with organic solvent means for dissolving said solid adhesive particle means within said spray material and for carrying said liquid resin particle means and said pigment means for permitting said spray material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects.

In accordance with another embodiment of this invention, a method of preparing a thermoplastic coating material for bonding to plastic objects such as polyolefin plastic objects including polyethylene plastic objects is disclosed comprising the steps of providing adhesive particle means in a range of from about 0% to about 99% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including

the polyethylene plastic objects; providing particulate polyolefin means in a range of from about 1% to about 99% by weight of total composition for providing a source of polyolefin for said coating material; and combining said adhesive particle means and said particulate polyolefin means with organic solvent means for thinning said adhesive particle means within said coating material to a paste consistency and for carrying said particulate polyolefin means for permitting said coating material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects.

In accordance with another embodiment of this invention, a method of preparing a thermoplastic spray material for bonding graphics to plastic objects such as polyolefin plastic objects including polyethylene plastic object is disclosed comprising the steps of providing rosin particle means in a range of from about 1% to about 99% by weight of total composition for providing a source of a resin that adheres to the polyolefin plastic objects including the polyethylene plastic objects; providing particulate polyolefin means in a range of from about 1% to about 99% by weight of total composition for providing a source of polyolefin for said spray material; and combining said rosin particle means and particulate polyolefin means with organic solvent means for dissolving said rosin particle means within said spray material and for carrying said particulate polyolefin means for permitting said spray material to bond graphics to the polyolefin plastic objects including the polyethylene plastic objects.

In accordance with another embodiment of this invention, a method of preparing a thermoplastic spray material for bonding graphics to plastic objects such as polyolefin plastic objects

including polyethylene plastic object is disclosed comprising the steps of providing polymer means in a range of from about 1% to about 10% by weight of total composition for providing an adhesive characteristic to said spray material; providing solid adhesive particle means in a range of from about 90% to about 99% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including polyethylene plastic objects; and combining said polymer means and said solid adhesive particle means with organic solvent means for dissolving said solid adhesive particle means within said spray material and for carrying said polymer means for permitting said spray material to bond said graphics to the polyolefin plastic objects including the polyethylene plastic object.

In accordance with still another embodiment of this invention, a method of coating plastic objects such as polyolefin plastic objects including polyethylene plastic objects is disclosed comprising the steps of applying to an interior surface of a mold a thermoplastic spray material comprising adhesive particle means in a range of from about 5% to about 95% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects, particulate polyolefin means in a range of from about 5% to about 95% by weight of total composition for providing a source of polyolefin for said spray material, pigment means in enough concentration to provide the required color opacity for said spray material, and organic solvent means for dissolving said adhesive particle means within said spray material and for carrying said particulate polyolefin means and said pigment means for permitting said spray material to be bonded to the polyolefin plastic objects

including the polyethylene plastic objects; adding a plastic powder to said interior surface of said mold; placing said mold in a heating apparatus that is hot enough to liquify said plastic powder and blend said thermoplastic spray material into the liquified plastic powder; rotating the mold while said mold is in said heating apparatus so that the liquified plastic powder will form to said interior surface of said mold; and cooling said mold so that a plastic object formed within said interior surface of said mold may be removed.

In accordance with still another embodiment of the present invention, a method of coating plastic objects such as polyolefin plastic objects including polyethylene plastic objects is disclosed comprising the steps of applying to a surface of a plastic object a thermoplastic spray material comprising adhesive particle means in a range of from about 5% to about 95% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects, particulate polyolefin means in a range of from about 5% to about 95% by weight of total composition for providing a source of polyolefin for said spray material, pigment means in enough concentration to provide the required color opacity for said spray material, and organic solvent means for dissolving said adhesive particle means within said spray material and for carrying said particulate polyolefin means and said pigment means for permitting said spray material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects; and applying heating means to said plastic object that is hot enough to bond said thermoplastic spray material into and onto the surface of said plastic object.

In accordance with still another embodiment of the present invention, a method of coating plastic objects such as polyolefin plastic objects including polyethylene plastic objects is disclosed comprising the steps of applying to an interior surface of a mold a thermoplastic spray material comprising liquid resin particle means in a range of from about 10% to about 40% by weight of total composition for providing a source of a resin that adheres to the polyolefin plastic objects including the polyethylene plastic objects, solid adhesive particle means in a range of from about 60% to about 90% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects, pigment means in enough concentration to provide the required color opacity for said spray material, and organic solvent means for dissolving said solid adhesive particle means within said spray material and for carrying said liquid resin particle means and said pigment means for permitting said spray material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects; adding a plastic powder to said interior surface of said mold; placing said mold in a heating apparatus that is hot enough to liquify said plastic powder and blend said thermoplastic coating material into said liquified plastic powder; rotating the mold while said mold is in said heating apparatus so that said liquified plastic powder will form to said interior surface of said mold; and cooling said mold so that a plastic object formed within said interior surface of said mold may be removed.

In accordance with another embodiment of the present invention, a method of coating plastic objects such as polyolefin plastic objects including polyethylene plastic objects is disclosed

comprising the steps of applying to an interior surface of a mold a thermoplastic coating material comprising adhesive particle means in a range of from about 0% to about 99% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects, particulate polyolefin means in a range of from about 1% to about 100% by weight of total composition for providing a source of polyolefin for said coating material, and organic solvent means for thinning said adhesive particle means within said coating material to a paste consistency and for carrying said particulate polyolefin means for permitting said coating material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects; adding a plastic powder to said interior surface of said mold; placing said mold in a heating apparatus that is hot enough to liquify said plastic powder and blend said thermoplastic coating material into said liquified plastic powder; rotating the mold while said mold is in said heating apparatus so that said liquified plastic powder will form to said interior surface of said mold; and cooling said mold so that a plastic object formed within said interior surface of said mold may be removed.

In accordance with another embodiment of the present invention, a method of coating plastic objects such as polyolefin plastic objects including polyethylene plastic objects is disclosed comprising the steps of applying to a decal like object a thermoplastic spray material comprising rosin particle means in a range of from about 1% to about 99% by weight of total composition for providing a source of a resin that adheres to the polyolefin plastic objects including the polyethylene plastic objects, particulate polyolefin means in a range of from about 1% to about

99% by weight of total composition for providing a source of polyolefin for said spray material, and organic solvent means for dissolving said rosin particle means within said spray material and for carrying said particulate polyolefin means for permitting said spray material to bond graphics to the polyolefin plastic objects including the polyethylene plastic objects; placing said decal like object onto an interior section of a mold; rubbing said decal like object onto said interior section of said mold; adding a plastic powder to said interior surface of said mold; placing said mold in a heating apparatus that is hot enough to liquify said plastic powder and blend said decal like object into the liquified plastic powder; rotating the mold while said mold is in said heating apparatus so that the liquified plastic powder will form to said interior surface of said mold; and cooling said mold so that a plastic object formed within said interior surface of said mold may be removed.

In accordance with another embodiment of the present invention, a method of coating plastic objects such as polyolefin plastic objects including polyethylene plastic objects is disclosed comprising the steps of applying to a decal like object a thermoplastic spray material comprising polymer means in a range of from about 1% to about 10% by weight of total composition for providing an adhesive characteristic to said spray material, solid adhesive particle means in a range of from about 90% to about 99% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including polyethylene plastic objects, and organic solvent means for dissolving said solid adhesive particle means within said spray material and for carrying said polymer means for permitting said

spray material to bond said graphics to the polyolefin plastic objects including the polyethylene plastic object; placing said decal like object onto an interior section of a mold; rubbing said decal like object onto said interior section of said mold; adding a plastic powder to said interior surface of said mold; placing said mold in a heating apparatus that is hot enough to liquify said plastic powder and blend said decal like object into said liquified powder plastic; rotating the mold while said mold is in said heating apparatus so that said liquified plastic powder will form to said interior surface of said mold; and cooling said mold so that a plastic object formed within said interior surface of said mold may be removed.

In accordance with another embodiment of the present invention, a method of coating plastic objects such as polyolefin plastic objects including polyethylene plastic objects is disclosed comprising the steps of applying a spray material to the surface of a release sheet, said spray material comprising adhesive particle means in a range of from about 5% to about 95% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects; particulate polyolefin means in a range of from about 5% to about 95% by weight of total composition for providing a source of polyolefin for said spray material; pigment means in enough concentration to provide the required color opacity for said spray material; organic solvent means for dissolving said adhesive particle means within said spray material and for carrying said particulate polyolefin means and said pigment means for permitting said spray material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects; and rheological means

in enough concentration for obtaining proper printing consistency for application of said spray material onto said release sheet; transferring said spray material from said release sheet onto a surface of said plastic object by placing the release sheet with the spray material side against said plastic object and rubbing said spray material onto the surface of said plastic object; removing the release sheet from said plastic object; and applying a heating source to an area where said spray material is on said plastic object that is hot enough to bond said spray material onto and into said surface of said plastic object.

The foregoing and other objects, features, and advantages of the invention will be apparent from the following, more particular, description of the preferred embodiment of the invention, as illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of one embodiment of the present invention being sprayed through a screen onto the interior surface of a mold.

Fig. 2 is a perspective view of the embodiment of fig. 1 being applied to the entire interior surface of a mold.

Fig. 3 is a perspective view of another embodiment of the present invention being rolled through a screen onto the interior surface of a mold.

Fig. 4 is a perspective view of the embodiment of fig. 3 being brushed through a screen onto the interior surface of a mold.

Fig. 5 is a perspective of one embodiment of the present invention being applied directly to the exterior surface of a plastic object.

Fig. 5a is a perspective view of the plastic object in fig. 5 being applied a heat source after being sprayed with ne embodiment of the present invention.

Fig. 6 is another embodiment of the present invention being applied to a decal like object, the decal object then being applied to the interior surface of a mold.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to fig. 1 and fig. 2, a thermoplastic spray material 10 is shown. The thermoplastic spray material 10 may be applied through a screen 12 onto an interior surface of a mold 14 as shown in fig. 1, or the thermoplastic spray material 10 may be applied to the entire interior surface of the mold 14 as shown in fig. 2. Once the mold 14 has been coated with the thermoplastic spray material 10, a plastic powder (not shown) is placed in the interior of mold 14. The mold 14 is then closed and the mold 14 goes through a process called rotational molding. The rotational molding process consist of placing the mold 14 in a heating apparatus (not shown) while slowly rotating the mold 14. The heat from the apparatus is strong enough to cause the plastic powder to liquify while the rotation of the mold causes the liquified plastic powder to form to the interior surface of the mold. The heat from the heating apparatus is also strong enough to blend the thermoplastic spray material 10 into the liquified plastic powder. Once the mold is cooled, a plastic object is formed that takes on the color of the thermoplastic spray material 10.

According to one embodiment of the invention, the thermoplastic spray material for bonding to plastic objects such as polyolefin plastic objects including polyethylene plastic objects

comprises an adhesive particle means in a range of from about 5% to about 95% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including polyethylene plastic objects; particulate polyolefin means in a range of from about 5% to about 95% by weight of total composition for providing a source of polyolefin for the spray material; pigment means in enough concentration to provide the required color opacity for the spray material; and organic solvent means for dissolving the adhesive particle means within the spray material and for carrying the particulate polyolefin means and the pigment means for permitting the spray material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects.

The adhesive particulate means that are used should be a thermoplastic binder. The thermoplastic binder should have a softening point between about 10 to about 122 degrees centigrade, wherein the softening point is defined to be the temperature where a material turns from a rigid state to a soft state. The thermoplastic binder is generally selected from the group consisting of rosins, derivatives of rosins, aliphatic hydrocarbon resins, terpene based resins, aromatic hydrocarbon resins, petroleum waxes, polymers, copolymers and mixtures thereof. In its preferred embodiment, the thermoplastic binder that is used is a combination of rosins which comprises about 70% by weight of the thermoplastic binder of a pentaerythritol ester of rosin and about 30% by weight of the thermoplastic binder of a hydrogenated methyl ester of rosin.

The particulate polyolefin means that are used in the thermoplastic spray material should be a polyolefin powder. In its

preferred embodiment, the polyolefin powder would have a particle size of less than 50 microns. Although a polyolefin powder having a particle size greater than 50 microns may be used, these types of powders have a tendency to clog a nozzle 11a of a canister 11.

The pigment means that are used in the thermoplastic spray material are generally selected from the group consisting of organic pigment means, inorganic pigment means, specialty pigment means, and mixtures thereof. Organic pigment means are generally considered to be elements such as chromothal, carbon black, pyrazolone, phthalocyanines, and mixtures thereof. Inorganic pigment means are generally considered to be elements such as cobalts, lead molybdates, cadmiums, synthetic iron oxides, lead chromates, titanium dioxides, and mixtures thereof. Specialty pigment means generally consist of pigments such as fluorescent, pearlescents, phosphorescences, liquid crystals, and mixtures thereof.

The organic solvent means used in the thermoplastic spray material must be able to dissolve the adhesive particle means. It must also be able to carry the particulate polyolefin means and the pigment means for permitting the thermoplastic spray material to be bonded to the plastic objects. The organic solvent means are generally selected from the group consisting of toluene, xylene, acetone, methyl ethyl ketone, VM&P naphtha, mineral spirits, methylene chloride, isopropyl alcohol, water, and mixtures thereof. In its preferred embodiment, the organic solvent means are acetone.

The thermoplastic spray material may further comprise additive means in enough concentration to produce the necessary function of enhancing certain properties of the spray material. For example: teflon powder means may be added to enhance a non-

stick protective surface; glass bead means may be added to enhance a reflective surface; metallic flake means such as nickel, aluminum, steel, graphite and mixtures thereof may be added as a decorative feature or to enhance the conductivity of the surface; ultraviolet stabilizers such as hindered amine light stabilizer means may be added for ultraviolet protection; gas and vapor barriers such as ethylene vinyl alcohol means may be added to form an impermeable gas barrier; silicone oil or grease means may be added to aid in a custom mold release; antimicrobials such as barium metaborate means may be added as a protective coating; and mixtures thereof.

Referring to fig. 5 and fig. 5a, the thermoplastic spray material 10 may be applied directly to a surface of a plastic object 20. Heating means 22 are then applied to the plastic object 20. Heating means 22 must be hot enough so that the thermoplastic spray material 10 will blend into and onto the surface of the plastic object 20. If the thermoplastic spray material 10 is not able to blend into and onto the surface of the plastic object 20, the thermoplastic spray material 10 on the plastic object 20 will chip and fade over time.

Referring to fig. 5a, the thermoplastic spray material (not shown) may also be applied to the surface of the plastic object 20 via a release sheet (not shown). Under this method, the thermoplastic spray material is printed onto a release sheet. Rheological additives such as fumed silica or organoclays may be added to the spray material in order for the spray material to obtain the proper consistency for application onto the transfer sheet. After allowing the spray material to dry, the release sheet is placed against the surface of the plastic object 20 with the

spray material side of the sheet against the surface of the plastic object 20. The spray material is then transferred from the release sheet to the surface of the plastic object by rubbing the dried spray material onto the surface of the plastic object 20. Heating means 22 are then applied to the plastic object 20. Heating means 22 must be hot enough so that the thermoplastic spray material will blend into and onto the surface of the plastic object 20.

In accordance with another embodiment of the present invention, the thermoplastic spray material for bonding to plastic objects such as polyolefin plastic objects including polyethylene plastic objects comprises liquid resin particle means in a range of from about 10% to about 40% by weight of total composition for providing a source of resin that adheres to the polyolefin plastic objects including polyethylene plastic objects; solid adhesive particle means in a range of from about 60% to about 90% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including polyethylene plastic objects; pigment means in enough concentration to provide the required color opacity for the spray material; and organic solvent means for dissolving the solid adhesive particle means within the spray material and for carrying the liquid resin particle means and the pigment means for permitting the spray material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects.

The liquid resin particle means that are used in the thermoplastic spray material should be a tackifying resin having a softening point between about 10 to about 122 degrees centigrade. The tackifying resin is generally selected from the group consisting of rosins, derivatives of rosins, aliphatic hydrocarbon resins,

terpen based resins, aromatic hydrocarbon resins, and mixtures thereof.

The solid adhesive particle means should be a thermoplastic binder. The thermoplastic binder should have a softening point between about 10 to about 122 degrees centigrade and is generally selected from the group consisting of rosins, derivatives of rosins, aliphatic hydrocarbon resins, terpene based resins, aromatic hydrocarbon resins, petroleum waxes, polymers, copolymers and mixtures thereof.

As with the previous embodiment, this embodiment also contains pigment means selected from the group consisting of organic pigment means, inorganic pigment means, specialty pigment means, and mixtures thereof. The elements within these groups are the same as listed above.

The organic solvent means used in this embodiment must be capable of dissolving the solid adhesive particle means and carrying the liquid resin means and the pigment means for permitting the spray material to be bonded to the polyolefin plastic objects including polyethylene plastic objects. As with the previous embodiment, the organic solvent is generally selected from the group consisting of toluene, xylene, acetone, methyl ethyl ketone, VM&P naphtha, mineral spirits, methylene chlorid, isopropyl alcohol, water, and mixtures thereof.

The thermoplastic spray material may further consist of additive means in enough concentration to perform the required purpose. Generally speaking, the additive means are used for enhancing certain properties of the spray material. The additives which may be added to the thermoplastic spray material are the same as those listed for the previous embodiment.

It should be noted that the above embodiment cannot be applied directly to a plastic object and heated as illustrated in fig. 5 and fig. 5a. The liquid resin means and the solid adhesive particle means in the above embodiment are not able to blend into and onto the surface of the plastic object. Thus, the thermoplastic spray material will chip and fade over time if it is applied directly to the surface of a plastic object. This particular embodiment will work when it is applied to an interior surface of a mold as illustrated in fig. 1 and fig. 2 and the mold goes through the rotational molding process.

According to another embodiment of the present invention, a thermoplastic coating material is disclosed. Referring to fig. 3 and fig. 4, it may be seen that the thermoplastic coating material may be applied by rolling means 16 as shown in fig. 3 or by brushing means as shown in fig. 4. While both figures show that the thermoplastic coating material is applied through a screen 12 onto the interior surface of a mold 14, it should be noted that the coating material may be applied directly to the entire interior surface of the mold 14. Furthermore, fig. 3 and fig. 4 only show the thermoplastic coating material being applied by rolling means 16 and brushing means 18. The thermoplastic coating material may be applied by any traditional painting means including stamping it onto a surface or screen printing it onto a surface.

The thermoplastic coating material for bonding to plastic objects such as polyolefin plastic objects including polyethylene plastic objects comprises adhesive particulate means in a range of from about 0% to about 99% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects,

particulate polyolefin means in a range of from about 1% to about 100% by weight of total composition for providing a source of polyolefin for the coating material, and organic solvent means for thinning the adhesive particle means within the coating material to a paste like consistency and for carrying the particulate polyolefin means for permitting said coating material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects.

As with previous embodiments, the adhesive particulate means that are used should be a thermoplastic binder. The thermoplastic binder should have a softening point between about 10 to about 122 degrees centigrade. The thermoplastic binder is generally selected from the group consisting of rosins, derivatives of rosin, aliphatic hydrocarbons resins, terpene based resins, aromatic hydrocarbon resins, petroleum waxes, polymers, copolymers and mixtures thereof.

The particulate polyolefin means that are used in the thermoplastic coating material should be a polyolefin powder having a particle size of less than 50 microns. While a polyolefin powder having a particle size smaller than 50 microns is preferred, a polyolefin powder having a particle size greater than 50 microns may also be used.

The organic solvent means that are used must be capable of thinning the adhesive particle means within the coating material to a paste like consistency and for carrying the particulate polyolefin means for permitting the coating material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects. The organic solvent is generally selected from the group consisting of toluene, xylene, acetone, methyl ethyl

keton , VM&P naphtha, mineral spirits, methylen chloride, isopropyl alcohol, water, and mixtures thereof.

The thermoplastic coating material may further comprise additive means in enough concentration to produce the necessary function of enhancing certain properties of the coating material. For example: teflon powder means may be added to enhance a non-stick protective surface; glass bead means may be added to enhance a reflective surface; metallic flake means such as nickel, aluminum, steel, graphite, and mixtures thereof may be added as a decorative feature or to enhance the conductivity of the surfac ; ultraviolet stabilizers such as hindered amine light stabilizer means may be added for ultraviolet protection; gas and vapor barriers such as ethylene vinyl alcohol means may be added to form an impermeable gas barrier; silicone oil or grease means may be added to aid in a custom mold release; antimicrobials such as barium metaborate means may be added as a protective coating; pigments such as organic pigments, inorganic pigments, specialty pigments, and mixtures thereof may be added to enhance the color of the paint. Organic pigments are generally considered to be elements such as cromothal, carbon black, pyrazolone, pthalocyanines, and mixtures thereof. Inorganic pigments are generally considered to be elements such as cobalts, lead molybdates, cadmiums, synthetic iron oxides, lead chromates, titanium dioxides, and mixtures thereof. Specialty pigments generally consist of pigments such as fluorescent, pearlescents, phosphorescences, liquid crystals, and mixtures thereof.

This particular embodiment of the present invention will work when applied to the interior surface of a mold as shown in figs. 3 and 4 and the mold goes through the rotational molding

process. It will also work if the paint is applied directly to a plastic object and heated as illustrated in figs. 5 and 5a.

Referring to fig. 6, another embodiment of the thermoplastic spray material 10 is shown. The thermoplastic spray material 10 is generally applied to a decal like object 24 which is then placed in an interior surface of a mold 14. The decal 24 is then rubbed off onto the interior surface of the mold 14. Plastic powder is then placed into the interior surface of the mold 14. The mold 14 is then closed and the mold 14 goes through the rotational molding process. The rotational molding process causes the plastic powder to liquify and the decal 24 to blend into the liquified plastic powder. When the mold is cooled, a plastic object is formed that has the decal blended into the exterior surface of the plastic object.

According to this embodiment, the thermoplastic spray material is capable of bonding graphics to plastic objects such as polyolefin plastic objects including polyethylene plastic objects. The thermoplastic spray material comprises rosin particle means in a range of from about 1% to about 99% by weight of total composition for providing a source of a resin that adheres to the polyolefin plastic objects including the polyethylene plastic objects; particulate polyolefin means in a range of from about 1% to about 99% by weight of total composition for providing a source of polyolefin for the spray material; and organic solvent means for dissolving the rosin particle means within said spray material and for carrying the particulate polyolefin means for permitting said spray material to bond the graphics to the polyolefin plastic objects including the polyethylene plastic objects.

The rosin particle means that are used in the thermoplastic spray material are generally a tackifying resin. The tackifying resin should have a softening point between about 10 to about 122 degrees centigrade.

The particulate polyolefin means that are used in the thermoplastic spray material should be a polyolefin powder. In its preferred embodiment, the polyolefin powder would have a particle size of less than 50 microns. Although a polyolefin powder having a particle size greater than 50 microns may be used, these types of powders have a tendency to clog a nozzle 11a of a canister 11.

The organic solvent means used in the thermoplastic spray material should be capable of dissolving the rosin particle means and for carrying the particulate polyolefin means for permitting the spray material to bond the graphics to the polyolefin plastic objects including the polyethylene plastic objects. The organic solvent is generally selected from the group consisting of toluene, xylene, acetone, methyl ethyl ketone, VM&P naphtha, mineral spirits, methylene chloride, isopropyl alcohol, water, and mixtures thereof.

According to another embodiment of the present invention the thermoplastic spray which is capable of bonding graphics to plastic such as polyolefin plastic objects including polyethylene plastic objects comprises polymer means in a range of from about 1% to about 10% by weight of total composition for providing an adhesive characteristic to the spray material; solid adhesive particle means in a range of from about 90% to about 99% by weight of total composition for providing a material that adheres to the polyolefin plastic objects including polyethylene plastic objects; and organic solvent means for dissolving the solid adhesive

particle means within said spray material and for carrying said polymer means for permitting said spray material to bond said graphics to the polyolefin plastic objects including the polyethylene plastic object.

The polymer means used in the thermoplastic spray material should be an adhesive backbone polymer. The adhesive backbone polymer is generally selected from the group consisting of butyl rubber, polyisobutylene, polychloroprene, ethylene vinyl acetate, and mixtures thereof.

The solid adhesive particle means used in the thermoplastic spray material should be a thermoplastic binder. The thermoplastic binder should have a softening point between about 10 to about 122 degrees centigrade. The thermoplastic binder used in the adhesive spray is generally selected from the group consisting of rosins, derivatives of rosin, aliphatic hydrocarbons resins, terpene based resins, aromatic hydrocarbon resins, petroleum waxes, polymers, copolymers and mixtures thereof.

The organic solvent means used in the thermoplastic spray material should be capable of dissolving the solid adhesive particle means and for carrying the polymer means for permitting the spray material to bond the graphics to the polyolefin plastic objects including the polyethylene plastic objects. The organic solvent is generally selected from the group consisting of toluene, xylene, acetone, methyl ethyl ketone, VM&P naphtha, mineral spirits, methylene chloride, isopropyl alcohol, water, and mixtures thereof.

While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that the foregoing and

other changes in form and details may be made therein without departing from the spirit of the invention.

WE CLAIM:

1. A thermoplastic spray material for bonding to plastic objects such as polyolefin plastic objects including polyethylene plastic objects comprising, in combination:

adhesive particle means in a range of from about 5% to about 95% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects;

particulate polyolefin means in a range of from about 5% to about 95% by weight of total composition for providing a source of polyolefin for said spray material;

pigment means in enough concentration to provide the required color opacity for said spray material; and

organic solvent means for dissolving said adhesive particle means within said spray material and for carrying said particulate polyolefin means and said pigment means for permitting said spray material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects.

2. A thermoplastic spray material in accordance with Claim 1 wherein said adhesive particle means are a thermoplastic binder.

3. A thermoplastic spray material in accordance with Claim 2 wherein said thermoplastic binder has a softening point between about 10 to about 122 degrees centigrade.

4. A therm plastic spray material in accordance with Claim 3 wherein said thermoplastic binder is selected from the group consisting of rosins, d rivatives of rosins, aliphatic hydrocarbon resins, terpene based resins, aromatic hydrocarbon resins, petroleum waxes, polymers, copolymers, and mixtures thereof.

5. A thermoplastic spray material in accordance with Claim 4 wherein said thermoplastic binder comprises:

about 70% by weight of said thermoplastic binder of a pentaerythritol ester of rosin; and

about 30% by weight of said thermoplastic binder of a hydrogenated methyl ester of rosin.

6. A thermoplastic spray material in accordance with Claim 1 wherein said particulate polyolefin means are a polyolefin powder having a particle size of less than about 50 microns.

7. A thermoplastic spray material in accordance with Claim 1 wherein said pigment means are selected from the group consisting of organic pigments means, inorganic pigments means, specialty pigments means, and mixtures thereof.

8. A thermoplastic spray material in accordance with Claim 7 wherein said pigment means are organic pigment means, said organic pigment means are selected from the group consisting of cromothal, carbon black, pyrazolone, pthalocyanines, and mixtures thereof.

9. A thermoplastic spray material in accordance with Claim 7 wherein said pigment means are inorganic pigment means, said inorganic pigment means are selected from the group consisting of cobalts, lead molybdates, cadmiums, synthetic iron oxides, lead chromates, titanium dioxides, and mixtures thereof.

10. A thermoplastic spray material in accordance with Claim 7 wherein said pigment means are specialty pigment means, said specialty pigment means are selected from the group consisting of fluorescent, pearlescents, phosphorescences, liquid crystals, and mixtures thereof.

11. A thermoplastic spray material in accordance with Claim 1 wherein said organic solvent means are selected from the group consisting of toluene, xylene, acetone, methyl ethyl ketone, VM&P naphtha, mineral spirits, methylene chloride, isopropyl alcohol, water, and mixtures thereof.

12. A thermoplastic spray material in accordance with Claim 1 wherein said organic solvent means are acetone.

13. A thermoplastic spray material in accordance with Claim 1 further comprising additive means in a concentration enough to provide the necessary function of enhancing certain properties of said thermoplastic spray material, said additive means are selected from the group consisting of teflon powder means for enhancing a non-stick protective surface; glass bead means for enhancing a reflective surface; metallic flake means for at least one of decorative purposes and for enhancing conductivity; hindered amine light stabilizer means for enhancing ultraviolet protection; ethylene vinyl alcohol means for providing an impermeable gas barrier; at least one of silicone oil and silicon grease means for providing a custom mold release; barium metaborate means for enhancing a protective coating; and mixtures thereof.

14. A thermoplastic spray material in accordance with Claim 13 wherein said additive means are metallic flake means, said metallic flake means are selected from the group consisting of nickel, aluminum, steel, graphite, and mixtures thereof.

15. A thermoplastic spray material for bonding to plastic objects such as polyolefin plastic objects including polyethylene plastic objects comprising, in combination:

liquid resin particle means in a range of from about 10% to about 40% by weight of total composition for providing a source of a resin that adheres to the polyolefin plastic objects including the polyethylene plastic objects.

solid adhesive particle means in a range of from about 60% to about 90% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects;

pigment means in enough concentration to provide the required color opacity for said spray material; and

organic solvent means for dissolving said adhesive particle means within said spray material and for carrying said liquid resin particle means and said pigment means for permitting said spray material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects.

16. A thermoplastic spray material in accordance with Claim 15 wherein said liquid resin particle means are a tackifying resin.

17. A thermoplastic spray material in accordance with Claim 16 wherein said tackifying resin has a softening point between about 10 to about 122 degrees centigrade.

18. A thermoplastic spray material in accordance with Claim 17 wherein said tackifying resin is selected from the group consisting of rosins, derivatives of rosins, aliphatic hydrocarbon resins, terpene based resins, aromatic hydrocarbon resins, and mixtures thereof.

19. A thermoplastic spray material in accordance with Claim 15 wherein said solid adhesive particle means are a thermoplastic binder.

20. A thermoplastic spray material in accordance with Claim 19 wherein said thermoplastic binder has a softening point between about 10 to about 122 degrees centigrade.

21. A thermoplastic spray material in accordance with Claim 20 wherein said thermoplastic binder is selected from the group consisting of rosins, derivatives of rosins, aliphatic hydrocarbon resins, terpene based resins, aromatic hydrocarbon resins, petroleum waxes, polymers, and copolymers, and mixtures thereof.

22. A thermoplastic spray material in accordance with Claim 15 wherein said pigment means are selected from the group consisting of organic pigment means, inorganic pigment means, specialty pigment means, and mixtures thereof.

23. A thermoplastic spray material in accordance with Claim 22 wherein said pigment means are organic pigment means, said organic pigment means are selected from the group consisting of chromothal, carbon black, pyrazolone, phthalocyanines, and mixtures thereof.

24. A thermoplastic spray material in accordance with Claim 22 wherein said pigment means are inorganic pigment means, said inorganic pigment means are selected from the group consisting of cobalts, lead molybdates, cadmiums, synthetic iron oxides, lead chromates, titanium dioxides, and mixtures thereof.

25. A thermoplastic spray material in accordance with Claim 22 wherein said pigment means are specialty pigment means, said specialty pigment means are selected from the group consisting of fluorescent, pearlescents, phosphorescences, liquid crystals, and mixtures thereof.

26. A thermoplastic spray material in accordance with Claim 15 wherein said organic solvent means are selected from the group consisting of toluene, xylene, acetone, methyl ethyl ketone, VM&P naphtha, mineral spirits, methylene chloride, isopropyl alcohol, water, and mixtures thereof.

27. A thermoplastic spray material in accordance with Claim 15 further comprising additive means in a concentration enough to provide the necessary function of enhancing certain properties of said thermoplastic spray material, said additive means are selected from the group consisting of teflon powder means for enhancing a non-stick protective surface; glass bead means for enhancing a reflective surface; metallic flake means for at least one of decorative purposes and for enhancing conductivity; hindered amine light stabilizer means for enhancing ultraviolet protection; ethylene vinyl alcohol means for providing an impermeable gas barrier; at least one of silicone oil and silicon grease means for providing a custom mold release; barium metaborate means for enhancing a protective coating; and mixtures thereof.

28. A thermoplastic spray material in accordance with Claim 27 wherein said additive means are metallic flake means, said metallic flake means are selected from the group consisting of nickel, aluminum, steel, graphite, and mixtures thereof.

29. A thermoplastic coating material for bonding to plastic objects such as polyolefin plastic objects including polyethylene plastic objects comprising, in combination:

adhesive particle means in a range of from about 0% to about 99% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects;

particulate polyolefin means in a range of from about 1% to about 100% by weight of total composition for providing a source of polyolefin for said spray material; and

organic solvent means for thinning said adhesive particle means within said coating material to a paste consistency and for carrying said particulate polyolefin means for permitting said coating material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects.

30. A thermoplastic coating material in accordance with Claim 29 wherein said adhesive particle means are a thermoplastic binder.

31. A thermoplastic coating material in accordance with Claim 30 wherein said thermoplastic binder has a softening point between about 10 to about 122 degrees centigrade.

32. A thermoplastic coating material in accordance with Claim 31 wherein said tackifying resin is selected from the group consisting of rosins, derivatives of rosin, aliphatic hydrocarbons resins, terpene based resins, aromatic hydrocarbon resins, and mixtures thereof.

33. A thermoplastic coating material in accordance with Claim 29 wherein said particulate polyolefin means are a polyolefin powder having a particle size of less than about 50 microns.

34. A thermoplastic coating material in accordance with Claim 29 wherein said organic solvent means are selected from the group consisting of toluene, xylene, acetone, methyl ethyl ketone, VM&P naphtha, mineral spirits, methylene chloride, isopropyl alcohol, water, and mixtures thereof.

35. A thermoplastic coating material in accordance with Claim 30 further comprising additive means in a concentration enough to provide the necessary function of enhancing certain properties of said coating material, said additive means are selected from the group consisting of teflon powder means for enhancing a non-stick protective surface; glass bead means for enhancing a reflective surface; metallic flake means for at least one of decorative purposes and for enhancing conductivity; hindered amine light stabilizer means for enhancing ultraviolet protection; ethylene vinyl alcohol means for providing an impermeable gas barrier; at least one of silicone oil and silicon grease means for providing a custom mold release; barium metaborate means for enhancing a protective coating; pigment means for enhancing the color of said thermoplastic coating material; and mixtures thereof.

36. A thermoplastic coating material in accordance with Claim 35 wherein said additive means are metallic flake means, said metallic flake means are selected from the group consisting of nickel, aluminum, steel, graphite, and mixtures thereof.

37. A thermoplastic coating material in accordance with Claim 35 wherein said additive means are pigment means, said pigment means are selected from the group consisting of organic pigment means, inorganic pigment means, specialty pigment means, and mixtures thereof.

38. A thermoplastic coating material in accordance with Claim 37 wherein said pigment means are organic pigment means, said organic pigment means are selected from the group consisting of chromothal, carbon black, pyrazolone, phthalocyanines, and mixtures thereof.

39. A thermoplastic coating material in accordance with Claim 37 wherein said pigment means are inorganic pigment means, said inorganic pigment means are selected from the group consisting of cobalts, lead molybdates, cadmiums, synthetic iron oxides, lead chromates, titanium dioxides, and mixtures thereof.

40. A thermoplastic coating material in accordance with Claim 37 wherein said pigment means are specialty pigment means, said specialty pigment means are selected from the group consisting of fluorescent, pearlescents, phosphorescences, liquid crystals, and mixtures thereof.

41. A thermoplastic spray material for bonding graphics to plastic objects such as polyolefin plastic objects including polyethylene plastic object comprising, in combination:

rosin particle means in a range of from about 1% to about 99% by weight of total composition for providing a source of a resin that adheres to the polyolefin plastic objects including the polyethylene plastic objects;

particulate polyolefin means in a range of from about 1% to about 99% by weight of total composition for providing a source of a resin that adheres to the polyolefin plastic objects including the polyethylene plastic objects; and

organic solvent means for dissolving said resin particle means within said spray material and for carrying said particulate polyolefin means for permitting said spray material to bond graphics to the polyolefin plastic objects including the polyethylene plastic objects.

42. A thermoplastic spray material in accordance with Claim 41 wherein said rosin particle means are a tackifying resin.

43. A thermoplastic spray material in accordance with Claim 42 wherein said tackifying resin has a softening point between about 10 to about 122 degrees centigrade.

44. A thermoplastic spray material in accordance with Claim 41 wherein said particulate polyolefin means are a polyolefin powder.

45. A thermoplastic spray material in accordance with Claim 44 wherein said polyolefin powder has a particle size of less than about 50 microns.

46. A thermoplastic spray material in accordance with Claim 41 wherein said organic solvent means are selected from the group consisting of toluene, xylene, acetone, methyl ethyl keton, VM&P naphtha, mineral spirits, methylene chloride, isopropyl alcohol, water, and mixtures thereof.

47. A thermoplastic spray material for bonding graphics to plastic objects such as polyolefin plastic objects including polyethylene plastic object comprising, in combination:

polymer means in a range of from about 1% to about 10% by weight of total composition for providing an adhesive characteristic to said spray material;

solid adhesive particle means in a range of from about 90% to about 99% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including polyethylene plastic objects; and

organic solvent means for dissolving said solid adhesive particle means within said spray material and for carrying said polymer means for permitting said spray material to bond said graphics to the polyolefin plastic objects including the polyethylene plastic object.

48. A thermoplastic spray material in accordance with Claim 47 wherein said polymer means are an adhesive backbone polymer.

49. A thermoplastic spray material in accordance with Claim 48 wherein said adhesive backbone polymer is selected from the group consisting of butyl rubber, polyisobutylene, polychloroprene, ethylene vinyl acetate, and mixtures thereof.

50. A thermoplastic spray material in accordance with Claim 47 wherein said solid adhesive particle means are a tackifying resin.

51. A thermoplastic spray material in accordance with Claim 50 wherein said tackifying resin has a softening point between about 10 to about 122 degrees centigrade.

52. A thermoplastic spray material in accordance with Claim 51 wherein said tackifying resin is selected from the group consisting of rosins, derivatives of rosins, aliphatic hydrocarbon resins, terpene based resins, aromatic hydrocarbon resins, and mixtures thereof.

53. A thermoplastic spray material in accordance with Claim 47 wherein said organic solvent means are selected from the group consisting of toluene, xylene, acetone, methyl ethyl ketone, VM&P naphtha, mineral spirits, methylene chloride, isopropyl alcohol, water, and mixtures thereof.

54. A method of preparing a thermoplastic spray material for bonding to plastic objects such as polyolefin plastic objects including polyethylene plastic objects comprising the steps of:

providing adhesive particle means in a range of from about 5% to about 95% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects;

providing a particulate polyolefin means in a range of from about 5% to about 95% by weight of total composition for providing a source of polyolefin for said spray material;

providing a pigment means in enough concentration to provide the required color opacity for said spray material; and

combining said adhesive particle means, said particulate polyolefin means, and said pigment means with organic solvent means for dissolving said adhesive particle means within said spray material and for carrying said particulate polyolefin means and said pigment means for permitting said spray material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects.

55. The method of Claim 54 wherein said step of providing adhesive particle means includes the step of selecting adhesive particle means that are a thermoplastic binder.

56. The method of Claim 55 wherein said step of selecting adhesive particle means that are a thermoplastic binder includes the step of selecting a thermoplastic binder that has a softening point between about 10 to about 122 degrees centigrade.

57. The method of Claim 56 wherein said step of selecting a thermoplastic binder includes the step of selecting a thermoplastic binder from the group consisting of rosins, derivatives of rosins, aliphatic hydrocarbon resins, terpene based resins, aromatic hydrocarbon resins, petroleum waxes, polymers, copolymers, and mixtures thereof.

58. The method of Claim 57 wherein said step of selecting a tackifying resin includes the steps of:

providing about 70% by weight of said tackifying resin of a pentaerythritol ester of rosin; and

providing about 30% by weight of said tackifying resin of a hydrogenated methyl ester of rosin.

59. The method of Claim 54 wherein said step of providing particulate polyolefin means includes the step of selecting a polyolefin powder having a particle size of less than about 50 microns.

60. The method of Claim 54 wherein said step of providing pigment means includes the step of selecting pigment means from the group consisting of organic pigment means, inorganic pigment means, specialty pigment means, and mixtures thereof.

61. The method of Claim 60 wherein the step of selecting pigment means includes the step of selecting organic pigment means, said organic pigment means are selected from the group consisting of chromothal, carbon black, pyrazolone, phthalocyanines, and mixtures thereof.

62. The method of Claim 60 wherein the step of selecting pigment means includes the step of selecting inorganic pigment, said inorganic pigment means are selected from the group consisting of cobalts, lead molybdates, cadmiums, synthetic iron oxides, lead chromates, titanium dioxides, and mixtures thereof.

63. The method of Claim 60 wherein the step of selecting pigment means includes the step of selecting specialty pigment means, said specialty pigment means are selected from the group consisting of fluorescent, pearlescents, phosphorescences, liquid crystals, and mixtures thereof.

64. The method of Claim 54 wherein said step of combining said adhesive particle means, said particulate polyolefin means, and said pigment means with organic solvent means includes the step of selecting organic solvent means from the group consisting of toluene, xylene, acetone, methyl ethyl ketone, VM&P naphtha, mineral spirits, methylene chloride, isopropyl alcohol, water, and mixtures thereof.

65. The method of Claim 64 wherein said step of selecting organic solvent means includes the step of selecting acetone.

66. The method of Claim 54 further comprising the step of providing additive means in a concentration enough to provide the necessary function of enhancing certain properties of said spray material, said additive means are selected from the group consisting of teflon powder means for enhancing a non-stick protective surface; glass bead means for enhancing a reflective surface; metallic flake means for at least one of decorative purposes and for enhancing conductivity; hindered amine light stabilizer means for enhancing ultraviolet protection; ethylene vinyl alcohol means for providing an impermeable gas barrier; at least one of silicone oil and silicon grease means for providing a custom mold release; barium metaborate means for providing a protective coating; and mixtures thereof.

67. The method of Claim 66 wherein said step of providing additive means includes the step of selecting metallic flake means, said metallic flake means are selected from the group consisting of nickel, aluminum, steel, graphite, and mixtures thereof.

68. A method of preparing a thermoplastic spray material for bonding to plastic objects such as polyolefin plastic objects including polyethylene plastic objects comprising the steps of:

providing liquid resin particle means in a range of from about 10% to about 40% by weight of total composition for providing a source of a resin that adheres to the polyolefin plastic objects including the polyethylene plastic objects;

providing solid adhesive particle means in a range of from about 60% to about 90% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects;

providing pigment means in enough concentration to provide the required color opacity for said spray material; and

combining said liquid resin particle means, said solid adhesive particle means, and said pigment means with organic solvent means for dissolving said solid adhesive particle means within said spray material and for carrying said liquid resin particle means and said pigment means for permitting said spray material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects.

69. The method of Claim 68 wherein said step of providing liquid resin particle means includes the step of selecting liquid resin particle means that are a tackifying resin.

70. The method of Claim 69 wherein said step of selecting liquid resin particle means that are a tackifying resin includes the step of selecting a tackifying resin that has a softening point between about 10 to about 122 degrees centigrade.

71. The method of Claim 70 wherein said tackifying resin is selected from a group consisting of rosins, derivatives of rosins, aliphatic hydrocarbon resins, terpene based resins, aromatic hydrocarbon resins, and mixtures thereof.

72. The method of Claim 68 wherein said step of providing solid adhesive particle means includes the step of selecting solid adhesive particle means that are a thermoplastic binder.

73. The method of Claim 72 wherein said step of selecting solid adhesive particle means that are a thermoplastic binder includes the step of selecting a thermoplastic binder that has a softening point between about 10 to about 122 degrees centigrade.

74. The method of Claim 73 wherein said thermoplastic binder is selected from a group consisting of rosins, derivatives of rosins, aliphatic hydrocarbon resins, terpene based resins, aromatic hydrocarbon resins, petroleum waxes, polymers, copolymers, and mixtures thereof.

75. The method of Claim 68 wherein said step of providing pigment means includes the step of selecting pigment means from the group consisting of organic pigment means, inorganic pigment means, specialty pigment means, and mixtures thereof.

76. The method of Claim 75 wherein the step of selecting pigment means includes the step of selecting organic pigment means, said organic pigment means are selected from the group consisting of cromothal, carbon black, pyrazolone, pthalocyanines, and mixtures thereof.

77. The method of Claim 75 wherein the step of selecting pigment means includes the step of selecting inorganic pigment means, said inorganic pigment means are selected from the group consisting of cobalts, lead molybdates, cadmiums, synthetic iron oxides, lead chromates, titanium dioxides, and mixtures thereof.

78. The method of Claim 75 wherein the step of selecting pigment means includes the step of selecting specialty pigment means, said specialty pigment means are selected from the group consisting of fluorescent, pearlescents, phosphorescences, liquid crystals, and mixtures thereof.

79. The method of Claim 68 wherein said step of combining said liquid resin particle means, said solid adhesive particle means, and said pigment means with organic solvent means includes the step of selecting organic solvent means from the group consisting of toluene, xylene, acetone, methyl ethyl ketone, VM&P naphtha, mineral spirits, methylene chloride, isopropyl alcohol, water, and mixtures thereof.

80. The method of Claim 68 further comprising the step of providing additive means in a concentration enough to provide the necessary function of enhancing certain properties of said thermoplastic spray material, said additive means are selected from the group consisting of teflon powder means for enhancing a non-stick protective surface; glass bead means for enhancing a reflective surface; metallic flake means for at least one of decorative purposes and for enhancing conductivity; hindered amine light stabilizer means for enhancing ultraviolet protection; ethylene vinyl alcohol means for providing an impermeable gas barrier; at least one of silicone oil and silicon grease means for providing a custom mold release; barium metaborate means for providing a protective coating; and mixtures thereof.

81. The method of Claim 80 wherein said step of providing additive means includes the step of selecting metallic flake means said metallic flake means are selected from the group consisting of nickel, aluminum, steel, graphite, and mixtures thereof.

82. A method of preparing a thermoplastic coating material for bonding to plastic objects such as polyolefin plastic objects including polyethylene plastic objects comprising the steps of:

providing adhesive particle means in a range of from about 0% to about 99% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects;

providing particulate polyolefin means in a range of from about 1% to about 100% by weight of total composition for providing a source of polyolefin for said spray material; and

combining said adhesive particle means and said particulate polyolefin means with organic solvent means for thinning said adhesive particle means within said coating material to a paste consistency and for carrying said particulate polyolefin means for permitting said coating material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects.

83. The method of Claim 82 wherein said step of providing adhesive particle means includes the step of selecting adhesive particle means that are a thermoplastic binder.

84. The method of Claim 83 wherein said step of selecting adhesive particle means that are a thermoplastic binder includes the step of selecting a thermoplastic binder that has a softening point between about 10 to about 122 degrees centigrade.

85. The method of Claim 84 wherein said thermoplastic binder is selected from a group consisting of rosins, derivatives of rosins, aliphatic hydrocarbon resins, terpene based resins, aromatic hydrocarbon resins, petroleum waxes, polymers, copolymers, and mixtures thereof.

86. The method of Claim 82 wherein said step of providing particulate polyolefin means includes the step of selecting a polyolefin powder having a particle size of less than about 50 microns.

87. The method of Claim 82 wherein said step of combining said adhesive particle means and said particulate polyolefin means with organic solvent means includes the step of selecting organic solvent means from the group consisting of toluene, xylene, acetone, methyl ethyl ketone, VM&P naphtha, mineral spirits, methylene chloride, isopropyl alcohol, water, and mixtures thereof.

88. The method of Claim 82 further comprising the step of providing additive means in a concentration enough to provide the necessary function of enhancing certain properties of said coating material, said additive means are selected from the group consisting of teflon powder means for enhancing a non-stick protective surface; glass bead means for enhancing a reflective surface; metallic flake means for at least one of decorative purposes and for enhancing conductivity; hindered amine light stabilizer means for enhancing ultraviolet protection; ethylene vinyl alcohol means for providing an impermeable gas barrier; at least one of silicone oil and silicon grease means for providing a custom mold release; barium metaborate means for providing a protective coating; pigment means for providing a source of a desired color for said coating material; and mixtures thereof.

89. The method of Claim 88 wherein said step of providing additive means includes the step of selecting metallic flake means said metallic flake means are selected from the group consisting of nickel, aluminum, steel, graphite, and mixtures thereof.

90. The method of Claim 88 wherein said step of providing additive means includes the step of selecting pigment means, said pigment means being selected from the group consisting of organic pigment means, inorganic pigment means, specialty pigment means, and mixtures thereof.

91. The method of Claim 90 wherein the step of selecting pigment means includes the step of selecting organic pigment means, said organic pigment means are selected from the group consisting of chromothal, carbon black, pyrazolone, phthalocyanines, and mixtures thereof.

92. The method of Claim 90 wherein the step of selecting pigment means includes the step of selecting inorganic pigment means, said inorganic pigment means are selected from the group consisting of cobalts, lead molybdates, cadmiums, synthetic iron oxides, lead chromates, titanium dioxides, and mixtures thereof.

93. The method of Claim 90 wherein the step of selecting pigment means includes the step of selecting specialty pigment means, said specialty pigment means are selected from the group consisting of fluorescent, pearlescents, phosphorescences, liquid crystals, and mixtures thereof.

94. A method of preparing a thermoplastic spray material for bonding graphics to plastic objects such as polyolefin plastic objects including polyethylene plastic object comprising the steps of:

providing rosin particle means in a range of from about 1% to about 99% by weight of total composition for providing a source of a resin that adheres to the polyolefin plastic objects including the polyethylene plastic objects;

providing particulate polyolefin means in a range of from about 1% to about 99% by weight of total composition for providing a source of polyolefin for said spray material; and

combining said rosin particle means and particulate polyolefin means with organic solvent means for dissolving said rosin particle means within said spray material and for carrying said particulate polyolefin means for permitting said spray material to bond graphics to the polyolefin plastic objects including the polyethylene plastic objects.

95. The method of Claim 94 wherein said step of providing rosin particle means includes the step of selecting rosin particle means that are a tackifying resin.

96. The method of Claim 95 wherein said step of selecting rosin particle means that are a tackifying resin includes the step of selecting a tackifying resin that has a softening point between about 10 to about 122 degrees centigrade.

97. The method of Claim 94 wherein said step of providing particulate polyolefin means includes the step of selecting a polyolefin powder.

98. The method of Claim 97 wherein said step of selecting polyolefin powder includes the step of selecting a polyolefin powder that has a particle size of less than about 50 microns.

99. The method of Claim 94 wherein said step of combining said rosin particle means and said particulate polyolefin means with organic solvent means includes the step of selecting organic solvent means from the group consisting of toluene, xylene, acetone, methyl ethyl ketone, VM&P naphtha, mineral spirits, methylene chloride, isopropyl alcohol, water, and mixtures thereof.

100. A method of preparing a thermoplastic spray material for bonding graphics to plastic objects such as polyolefin plastic objects including polyethylene plastic object comprising the steps of:

providing polymer means in a range of from about 1% to about 10% by weight of total composition for providing an adhesive characteristic to said spray material;

providing solid adhesive particle means in a range of from about 90% to about 99% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including polyethylene plastic objects; and

combining said polymer means and said solid adhesive particle means with organic solvent means for dissolving said solid adhesive particle means within said spray material and for carrying said polymer means for permitting said spray material to bond said graphics to the polyolefin plastic objects including the polyethylene plastic object.

101. The method of Claim 100 wherein said step of providing polymer means includes the step of selecting an adhesive backbone polymer.

102. The method Claim of 101 wherein said step of selecting an adhesive backbone polymer includes the step of selecting an adhesive backbone polymer from the group consisting of butyl rubber, polyisobutylene, polychloroprene, ethylene vinyl acetate, and mixtures thereof.

103. The method of Claim 100 wherein said step of providing solid adhesive particle means includes the step of selecting solid adhesive particle means that are a tackifying resin.

104. The method of Claim 103 wherein said step of selecting solid adhesive particle means that are a tackifying resin includes the step of selecting a tackifying resin that has a softening point between 10 to 122 degrees centigrade.

105. The method of Claim 104 wherein said tackifying resin is selected from the group consisting of rosins, derivatives of rosins, aliphatic hydrocarbon resins, terpene based resins, aromatic hydrocarbon resins, and mixtures thereof.

106. The method of Claim 100 wherein said step of combining said polymer means and said solid adhesive particle means with organic solvent means includes the step of selecting organic solvent from the group consisting of toluene, acetone, methyl ethyl ketone, VM&P naphtha, mineral spirits, methylene chloride, isopropyl alcohol, water, and mixtures thereof.

107. A method of coating plastic objects such as polyolefin plastic objects including polyethylene plastic objects comprising the steps of:

applying to an interior surface of a mold a thermoplastic spray material comprising:

adhesive particle means in a range of from about 5% to about 95% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects;

particulate polyolefin means in a range of from about 5% to about 95% by weight of total composition for providing a source of polyolefin for said spray material;

pigment means in enough concentration to provide the required color opacity for said spray material; and

organic solvent means for dissolving said adhesive particle means within said spray material and for carrying said particulate polyolefin means and said pigment means for permitting said spray material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects;

adding a plastic powder to said interior surface of said mold;

placing said mold in a heating apparatus that is hot enough to liquify said plastic powder and blend said thermoplastic spray material into the liquified plastic powder;

rotating the mold while said mold is in said heating apparatus so that the liquified plastic powder will form to said interior surface of said mold; and

cooling said mold so that a plastic object formed within said interior surface of said mold may be removed.

108. A method of coating plastic objects such as polyolefin plastic objects including polyethylene plastic objects comprising the steps of:

applying to a surface of a plastic object a thermoplastic spray material comprising:

adhesive particle means in a range of from about 5% to about 95% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects;

particulate polyolefin means in a range of from about 5% to about 95% by weight of total composition for providing a source of polyolefin for said spray material;

pigment means in enough concentration to provide the required color opacity for said spray material; and

organic solvent means for dissolving said adhesive particle means within said spray material and for carrying said particulate polyolefin means and said pigment means for permitting said spray material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects; and

applying heating means to said plastic object that is hot enough to bond said thermoplastic spray material onto and into the surface of said plastic object.

109. A method of coating plastic objects such as polyolefin plastic objects including polyethylene plastic objects comprising the steps of:

applying to an interior surface of a mold a thermoplastic spray material comprising:

liquid resin particle means in a range of from about 10% to about 40% by weight of total composition for providing a source of a resin that adheres to the polyolefin plastic objects including the polyethylene plastic objects;

solid adhesive particle means in a range of from about 60% to about 90% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects;

pigment means in enough concentration to provide the required color opacity for said spray material; and

organic solvent means for dissolving said solid adhesive particle means within said spray material and for carrying said liquid resin particle means and said pigment means for permitting said spray material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects;

adding a plastic powder to said interior surface of said mold;

placing said mold in a heating apparatus that is hot enough to liquify said plastic powder and blend said thermoplastic coating material into said liquified plastic powder;

rotating the mold while said mold is in said heating apparatus so that said liquified plastic powder will form to said interior surface of said mold; and

cooling said mold so that a plastic object formed within said interior surface of said mold may be removed.

110. A method of coating plastic objects such as polyolefin plastic objects including polyethylene plastic objects comprising the steps of:

applying to an interior surface of a mold a thermoplastic coating material comprising:

adhesive particle means in a range of from about 0% to about 99% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects;

particulate polyolefin means in a range of from about 1% to about 100% by weight of total composition for providing a source of polyolefin for said spray material; and

organic solvent means for thinning said adhesive particle means within said coating material to a paste consistency and for carrying said particulate polyolefin means for permitting said coating material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects;

adding a plastic powder to said interior surface of said mold;

placing said mold in a heating apparatus that is hot enough to liquify said plastic powder and blend said thermoplastic coating material into said liquified plastic powder;

rotating the mold while said mold is in said heating apparatus so that said liquified plastic powder will form to said interior surface of said mold; and

cooling said mold so that a plastic object formed within said interior surface of said mold may be removed.

111. A method of coating plastic objects such as polyolefin plastic objects including polyethylene plastic objects comprising the steps of:

applying to a decal like object a thermoplastic spray material comprising:

rosin particle means in a range of from about 1% to about 99% by weight of total composition for providing a source of a resin that adheres to the polyolefin plastic objects including the polyethylene plastic objects;

particulate polyolefin means in a range of from about 1% to about 99% by weight of total composition for providing a source of polyolefin for said spray material; and

organic solvent means for dissolving said rosin particle means within said spray material and for carrying said particulate polyolefin means for permitting said spray material to bond graphics to the polyolefin plastic objects including the polyethylene plastic objects;

placing said decal like object onto an interior surface of a mold;

rubbing said decal like object onto said interior surface of said mold;

adding a plastic powder to said interior surface of said mold;

placing said mold in a heating apparatus that is hot enough to liquify said plastic powder and blend said decal like object into the liquified plastic powder;

rotating the mold while said mold is within said heating apparatus so that the liquified powder plastic will form to said interior surface of said mold; and

cooling said mold so that a plastic object formed within said interior surface of said mold may be removed.

112. A method of coating plastic objects such as polyolefin plastic objects including polyethylene plastic objects comprising the steps of:

applying to a decal like object a thermoplastic spray material comprising:

polymer means in a range of from about 1% to about 10% by weight of total composition for providing an adhesive characteristic to said spray material;

solid adhesive particle means in a range of from about 90% to about 99% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including polyethylene plastic objects; and

organic solvent means for dissolving said solid adhesive particle means within said spray material and for carrying said polymer means for permitting said spray material to bond said graphics to the polyolefin plastic objects including the polyethylene plastic object;

placing said decal like object onto an interior surface of a mold;

rubbing said decal like object onto said interior surface of said mold;

adding a plastic powder to said interior surface of said mold;

placing said mold in a heating apparatus that is hot enough to liquify said plastic powder and blend said decal like object into said liquified plastic powder;

rotating the mold while said mold is in said heating apparatus so that said liquified plastic powder will form to said interior surface of said mold; and

cooling said mold so that a plastic object formed within said interior surface of said mold may be removed.

113. A thermoplastic spray material in accordance with Claim 1 further comprising rheological means for obtaining a proper printing consistency for said thermoplastic spray material so said thermoplastic spray material may be applied to a transfer sheet.

114. A thermoplastic spray material in accordance with Claim 113 wherein said rheological means is selected from the group consisting of fumed silica, organoclays, and mixtures thereof.

115. The method of Claim 54 further comprising the step of providing rheological means for obtaining a proper printing consistency for said thermoplastic spray material so said thermoplastic spray material may be applied to a transfer sheet.

116. The method of Claim 115 wherein said step of providing rheological means further comprises the step of selecting rheological means from the group consisting of fumed silica, organoclays, and mixtures thereof.

117. A method of coating plastic objects such as polyolefin plastic objects including polyethylene plastic objects comprising the steps of:

applying a coating material to a surface of a release sheet, said coating material comprising:

adhesive particle means in a range of from about 5% to about 95% by weight of total composition for providing a source of a material that adheres to the polyolefin plastic objects including the polyethylene plastic objects;

particulate polyolefin means in a range of from about 5% to about 95% by weight of total composition for providing a source of polyolefin for said coating material;

pigment means in enough concentration to provide the required color opacity for said coating material;

organic solvent means for dissolving said adhesive particle means within said spray material and for carrying said particulate polyolefin means and said pigment means for permitting said spray material to be bonded to the polyolefin plastic objects including the polyethylene plastic objects; and

rheological means in enough concentration for obtaining proper printing consistency for application of said coating material onto said release sheet;

transferring said coating material from said transfer sheet onto a surface of said plastic object by placing the release sheet with the coating material side against said plastic object and rubbing said coating material onto the surface of said plastic object;

removing the release sheet from said plastic object; and

applying a heating source to an area where said coating material is on said plastic object that is hot enough to bond said coating material onto and into said surface of said plastic object.

118. The method of Claim 117 wherein said rheological means is selected from the group consisting of fumed silica, organoclays, and mixtures thereof.

AMENDED CLAIMS

[received by the International Bureau on 20 June 1996 (20.06.96);
original claims 1-118 replaced by amended claims 1-12 (2 pages)]

1. A thermoplastic spray material for bonding to plastic objects such as polyolefin plastic objects including polyethylene plastic objects which comprises the composition of:

- 5 a. an adhesive that adheres to polyolefin plastic objects in an amount ranging from 5% to 95% by weight of the composition;
- 10 b. particulate polyolefin in an amount ranging from 5% to 95% by weight of the composition;
- c. a pigment in sufficient concentration to provide a required color for said spray material; and
- 15 d. a solvent in sufficient quantity to dissolve said adhesive and carry said particulate polyolefin and pigment.

20 2. The thermoplastic spray material of claim 1 wherein the polyolefin plastic object is a polyethylene plastic object and the particulate polyolefin is polyethylene.

 3. The thermoplastic spray material of claim 1 wherein the particulate polyolefin is a polyolefin powder having a particle size less than 50 microns.

25 4. The thermoplastic spray material of claim 1 wherein the adhesive has a softening point between 10°C. and 122°C.

30 5. The thermoplastic spray material of claim 4 wherein the adhesive is a member of the group consisting of: rosin, derivatives of rosin, aliphatic hydrocarbon resins, terpene based resins, aromatic hydrocarbon resins, petroleum waxes, and mixtures thereof.

6. The thermoplastic spray material of claim 5 wherein the adhesive is a combination of about 70% by weight of a pentaerythritol ester of rosin and about 30% by weight of a hydrogenated methyl ester of rosin.

5 7. The thermoplastic spray material of claim 1 wherein the solvent is a member of the group consisting of toluene, xylene, acetone, methyl ethyl ketone, naphtha, mineral spirits, methylene chloride, isopropyl alcohol, water and mixtures thereof.

10 8. In the method for molding an object from a polyolefin resin in a cavity of a mold for the object, by the steps of: heating the mold, introducing the polyolefin resin into the cavity of the heated mold, cooling the mold and removing the object from the mold, the improvement
15 comprising applying the thermoplastic spray material of any of claims 1 to 7 to an interior surface of the cavity of the mold prior to introducing the resin into the cavity.

 9. The method of claim 7 wherein the spray material is applied to the interior surface of the mold
20 prior to heating of the mold.

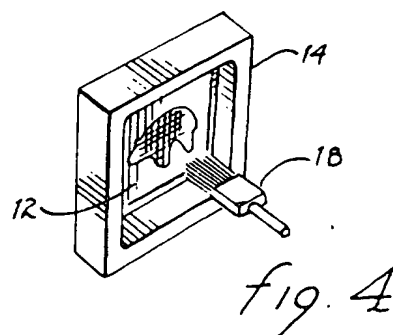
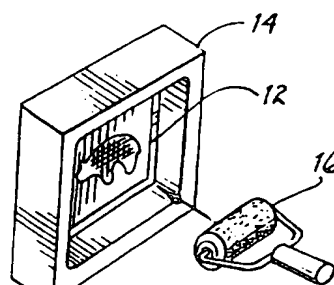
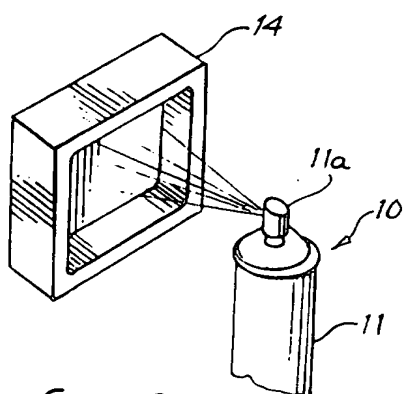
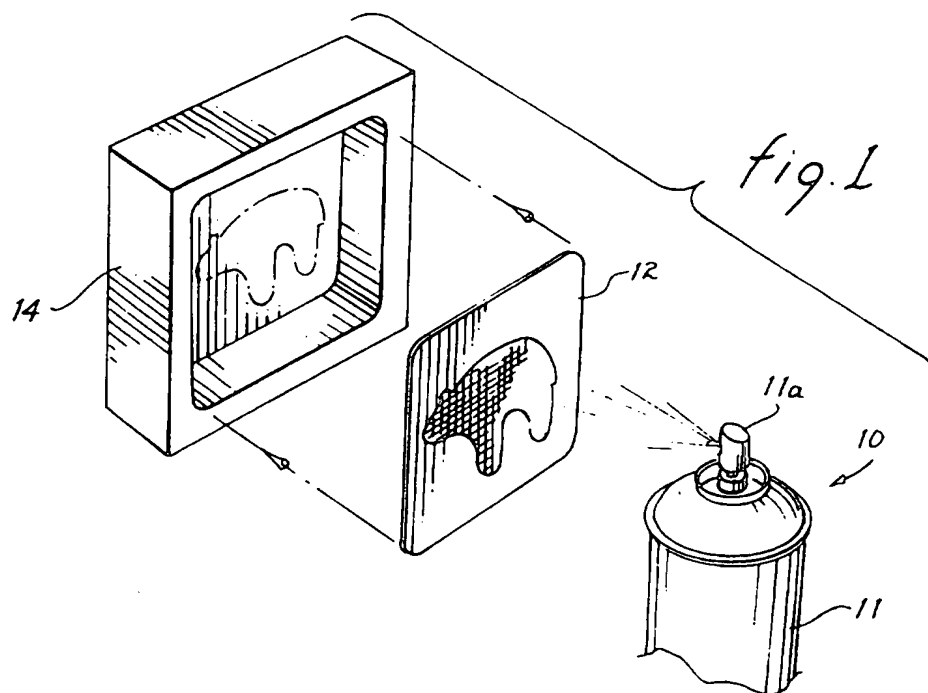
 10. The method of claim 7 wherein the resin is polyethylene.

 11. In the method for coating a plastic object formed of a polyolefin resin by the steps of:

25 applying the thermoplastic spray material of any of claims 1 to 7 to the surface of the plastic object to coat the surface of the object with the material; and

 heating the plastic object to a temperature sufficient to bond the thermoplastic spray material onto and into the
30 surfac of the object.

 12. The method of claim 10 wherein the polyolefin resin is polyethylene.



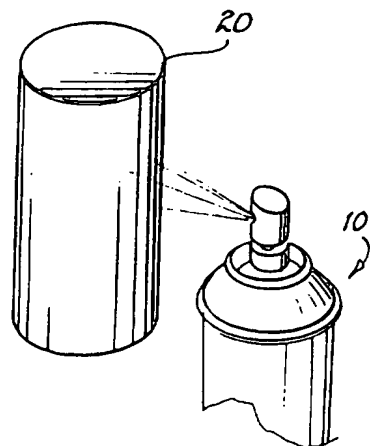


fig. 5

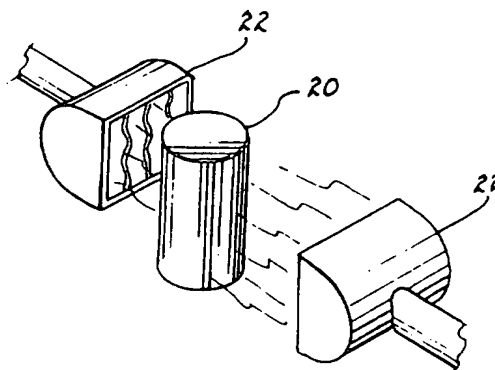


fig. 5a.

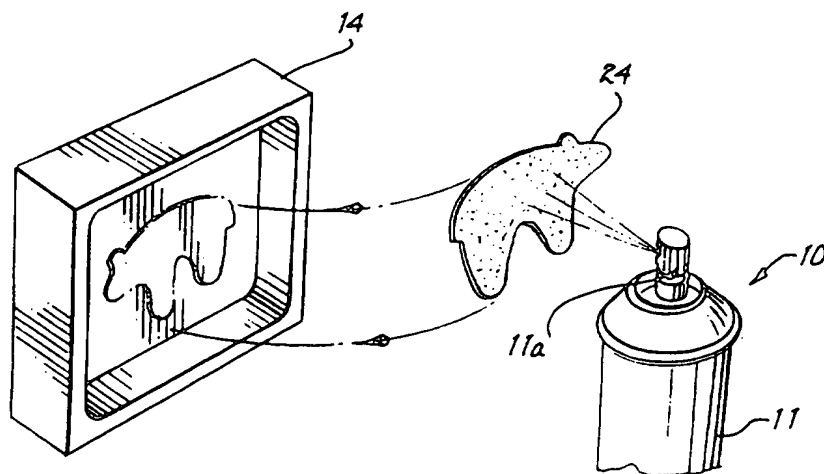


fig. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/00587**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :C09J 123/06, 145/00

US CL :524/274, 275, 277, 528

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 524/274, 275, 277, 528

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONEElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)
NONE**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 5,360,855 (GOBRAN) 01 November 1994, claims 1-28.	1-118
Y	US, A, 5,244,962 (PLAMTHOTTAM et al.) 14 September 1993, claims 1-24.	1-118
Y	US, A, 5,115,035 (SHIRAKI et al.) 19 May 1992, claims 1-7.	1-118
Y	US, A, 3,993,613 (DOSS et al.) 23 November 1976, claims 1-9.	1-118
Y	US, A, 3,929,703 (WEYMANN et al.) 30 December 1975, claims 1-10.	1-118

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be part of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
E earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	* & * document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 01 APRIL 1996	Date of mailing of the international search report 26 APR 1996
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer <i>Edward Cain</i> EDWARD CAIN Telephone No. (703) 308-2351